International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04N 13/04, G02B 27/26

A1

(11) International Publication Number: WO 00/21305

(43) International Publication Date: 13 April 2000 (13.04.00)

(21) International Application Number: PCT/KR99/00596

(22) International Filing Date: 30 September 1999 (30.09.99)

(30) Priority Data:
1998/41451 1 October 1998 (01.10.98) KR

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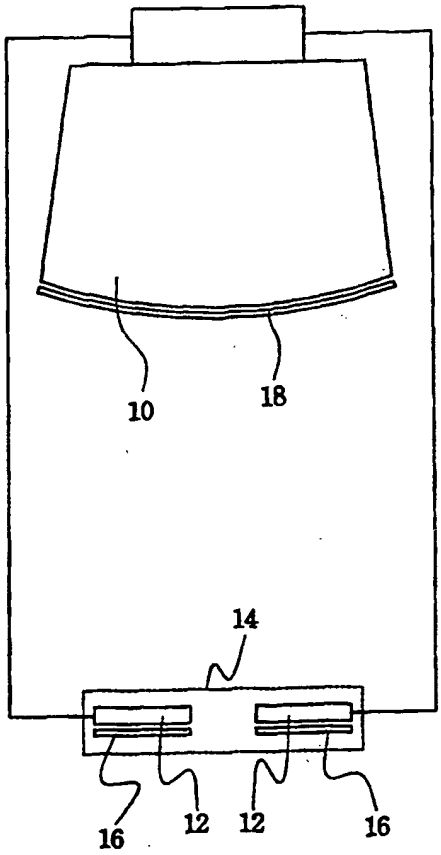
(81) Designated States: CA, CN, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: THREE-DIMENSIONAL IMAGE FLUOROSCOPY SYSTEM

(57) Abstract

In a three-dimensional image fluoroscopy system constructed by a three-dimensional image monitor (10) and three-dimensional image fluoroscopy glasses (14), the three-dimensional image fluoroscopy glasses (14) having a liquid crystal shutter (12) to see the three-dimensional image monitor (10) by fluoroscopy, the system comprises one polarized-light film set (16) only to an eye lens side in the liquid crystal shutter (12) of the three-dimensional image fluoroscopy glasses (14); and another polarized-light film (18) of a both-eyes common usage set to a fore face of the three-dimensional image monitor (10). Under such construction, incident light of an object not polarized in spite of an operation of the liquid crystal shutter (12) enters through the liquid crystal shutter (12) and the polarized-light film (16) of the eyes lens side, in a case of seeing by fluoroscopy objects except that displayed on the three-dimensional image monitor (10). Accordingly, there is not a flickering phenomenon regardless of the operation of the liquid crystal shutter (12), and there is an additional effect that right and left images on a screen of the three-dimensional image monitor (10) are not mixed each other, even though a user sees by fluoroscopy the three-dimensional image monitor (10) in an oblique posture in a state of wearing the three-dimensional image fluoroscopy glasses (14).



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THREE DIMENSIONAL IMAGE FLUOROSCOPY SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a three-dimensional image fluoroscopy system, and more particularly, to a three-dimensional image fluoroscopy system capable of preventing a flickering phenomenon when a user sees by fluoroscopy objects except that displayed on a three-dimensional image monitor under a state of wearing three-dimensional image fluoroscopy glasses.

Discussion of Related Art

In a general three-dimensional image fluoroscopy system shown in Fig. 1 as a typical example, a three-dimensional image is displayed on a three-dimensional image monitor 1, and a user puts on three-dimensional image fluoroscopy glasses 5 provided with a liquid crystal shutter 4, to thereby see the three-dimensional image by fluoroscopy, wherein the liquid crystal shutter 4 is disposed between fore and rear polarized-light films 2,3 having a polarized angle of 90 degrees.

Herewith, the liquid crystal shutter 4 is connected electrically so as to synchronize to an image signal of the three-dimensional image monitor 1. As well-known, right and left eyes fluoroscopy images are displayed on the three-dimensional image monitor 1 at a speed of 60 frames per second, and right and left liquid crystal shutters 4 are turned on/off by an input of the signals synchronizing to the images of the three-dimensional image monitor 1, to thus enable to see the three-dimensional images by fluoroscopy.

In such constructed three-dimensional image fluoroscopy system, however, in case the user sees other objects by

fluoroscopy instead of staring at images displayed on the three-dimensional image monitor 1 in a state of wearing the glasses 5, the user feels a serious flickering phenomenon caused by an operation of the liquid crystal shutter 4, therefore feels a severe eye strain.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a three-dimensional image fluoroscopy system that substantially obviate one or more of the limitations and disadvantages of the related art.

A primary object of the present invention is to provide a three-dimensional image fluoroscopy system, in which a polarized-light film of a fore face provided in a prior art is removed from three-dimensional image fluoroscopy glasses, to thereby prevent a flickering phenomenon by incident light of an object not based on polarized-light in spite of an operation of a liquid crystal shutter, in a case of seeing by fluoroscopy objects except that displayed on the three-dimensional image monitor, meantime to enable to appreciate three-dimensional images in a case of seeing images of the three-dimensional image monitor by fluoroscopy.

To achieve these and other advantages, and in accordance with the purpose of the present invention as embodied and broadly described, in a three-dimensional image fluoroscopy system constructed by a three-dimensional image monitor and three-dimensional image fluoroscopy glasses, the three-dimensional image fluoroscopy glasses having a liquid crystal shutter to see the three-dimensional image monitor by fluoroscopy, the system comprises one polarized-light film set only to an eye lens side in the liquid crystal shutter of the three-dimensional image fluoroscopy glasses; and another

polarized-light film of a both-eyes common usage set to a fore face of the three-dimensional image monitor.

Further, in a three-dimensional image fluoroscopy system composed of a three-dimensional image monitor and three-dimensional image fluoroscopy glasses, the three-dimensional image fluoroscopy glasses having a liquid crystal shutter to see the three-dimensional image monitor by fluoroscopy, the system includes a polarized-light film set to an eye lens side in the liquid crystal shutter positioned between the polarized-light film and a phase difference film; a phase difference film set, being directed to the three-dimensional image monitor side, onto the liquid crystal shutter; and a circularly polarized-light film of a both-eyes common usage adhering to a fore face of the three-dimensional image monitor.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE ATTACHED DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

Fig. 1 represents a schematic view showing a conventional three-dimensional image fluoroscopy system;

Fig. 2 indicates a schematic view providing a three-dimensional image fluoroscopy system based on a first

embodiment in accordance with the present invention; and

Fig. 3 sets forth a schematic view depicting a three-dimensional image fluoroscopy system based on a second embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

As shown in Fig. 2, a three-dimensional image fluoroscopy system based on a first embodiment of the invention is constructed by a three-dimensional image monitor 10 and three-dimensional image fluoroscopy glasses 14, the three-dimensional image fluoroscopy glasses having a liquid crystal shutter 12 to see by fluoroscopy the three-dimensional image monitor. In this construction, the three-dimensional image fluoroscopy system is composed of one polarized-light film 16 set only to an eye lens side in the liquid crystal shutter 12 of the three-dimensional image fluoroscopy glasses 14; and another polarized-light film 18 of a both-eyes common usage set to a fore face of the three-dimensional image monitor 10.

Operations of such constructed system are described as follows.

A user puts on the three-dimensional image fluoroscopy glasses 14, and he can feel three-dimensional images by such procedures that an operation of a polarization light is performed through the polarized-light film 18 of the both-eyes common usage adhering onto a fore face of the three-dimensional image monitor 10, that it again passes through the liquid crystal shutter 12, and that an operation of the polarization light is also executed through the polarized-light film 16 of the eye lens side.

Meanwhile, in case the user sees other objects instead of them on the three-dimensional image monitor 10 under a state of wearing the three-dimensional image fluoroscopy glasses 14, it is available to normally see them without a flickering phenomenon, regardless of an operation of the liquid crystal shutter 12, since incident light of other objects not polarized enters through the liquid crystal shutter 12 and the polarized-light film 16 of the eye lens side.

As shown in Fig. 3, a three-dimensional image fluoroscopy system based on a second embodiment of the present invention is constructed by a three-dimensional image monitor 10 and three-dimensional image fluoroscopy glasses 14, the three-dimensional image fluoroscopy glasses having a liquid crystal shutter 12 to see by fluoroscopy the three-dimensional image monitor. In this construction, the three-dimensional image fluoroscopy system includes a polarized-light film 16 set to an eye lens side of the liquid crystal shutter 12 positioned between the polarized-light film 16 and a phase difference film 20; a phase difference film 20 set, being directed to the three-dimensional image monitor side, onto the liquid crystal shutter 12; and a circularly polarized-light film 30 adhering to a fore face of the three-dimensional image monitor 10.

The penetration light from the three-dimensional image monitor 10 becomes a circularly polarized light state through the circularly polarized-light film 18, therefore, not only right and left images on a screen of the three-dimensional image monitor 10 do not become composite each other, but also a peripherally flickering phenomenon does not occur, even though a user sees by fluoroscopy the three-dimensional image monitor 10 in an oblique posture in a state of wearing the three-dimensional image fluoroscopy glasses 14.

As afore-mentioned, in accordance with the inventive

three-dimensional image fluoroscopy system, a polarized-light film is set only to an eye lens, or a phase difference film adheres, being directed to a three-dimensional image monitor side, to the liquid crystal shutter. Further, a polarized-light film based on a both-eyes common usage, or a circularly polarized-light film adheres to a fore face of a three-dimensional image monitor. Under such construction, incident light of an object not polarized in spite of an operation of a liquid crystal shutter enters through the liquid crystal shutter and the polarized-light film of the eye lens side, in a case of seeing by fluoroscopy objects except that displayed on the three-dimensional image monitor, accordingly, there is not a flickering phenomenon regardless of the operation of the liquid crystal shutter. In addition, there is an effect that right and left images on a screen of the three-dimensional image monitor are not mixed each other, even though a user sees by fluoroscopy the three-dimensional image monitor in an oblique posture in a state of wearing the three-dimensional image fluoroscopy glasses.

It will be apparent to those skilled in the art that various modifications and variations can be made in the three-dimensional image fluoroscopy system of the present invention without deviating from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A three-dimensional image fluoroscopy system constructed by a three-dimensional image monitor and three-dimensional image fluoroscopy glasses, said three-dimensional image fluoroscopy glasses having a liquid crystal shutter to see the three-dimensional image monitor by fluoroscopy, said system comprising:

one polarized-light film set only to an eye lens side in the liquid crystal shutter of the three-dimensional image fluoroscopy glasses; and

another polarized-light film of a both-eyes common usage set to a fore face of the three-dimensional image monitor.

2. A three-dimensional image fluoroscopy system composed of a three-dimensional image monitor and three-dimensional image fluoroscopy glasses, said three-dimensional image fluoroscopy glasses having a liquid crystal shutter to see the three-dimensional image monitor by fluoroscopy, said system comprising:

a polarized-light film set to an eye lens side in the liquid crystal shutter positioned between the polarized-light film and a phase difference film;

a phase difference film set, being directed to the three-dimensional image monitor side, onto the liquid crystal shutter; and

a circularly polarized-light film of a both-eyes common usage adhering to a fore face of the three-dimensional image monitor.

3. Three-dimensional image fluoroscopy glasses having a liquid crystal shutter to see by fluoroscopy a

three-dimensional image monitor in a three-dimensional image fluoroscopy system, said glasses comprising:

a polarized-light film set to an eye lens side in the liquid crystal shutter positioned between the polarized-light film and a phase difference film; and

a phase difference film set, being directed to the three-dimensional image monitor side, onto the liquid crystal shutter.

FIG. 1

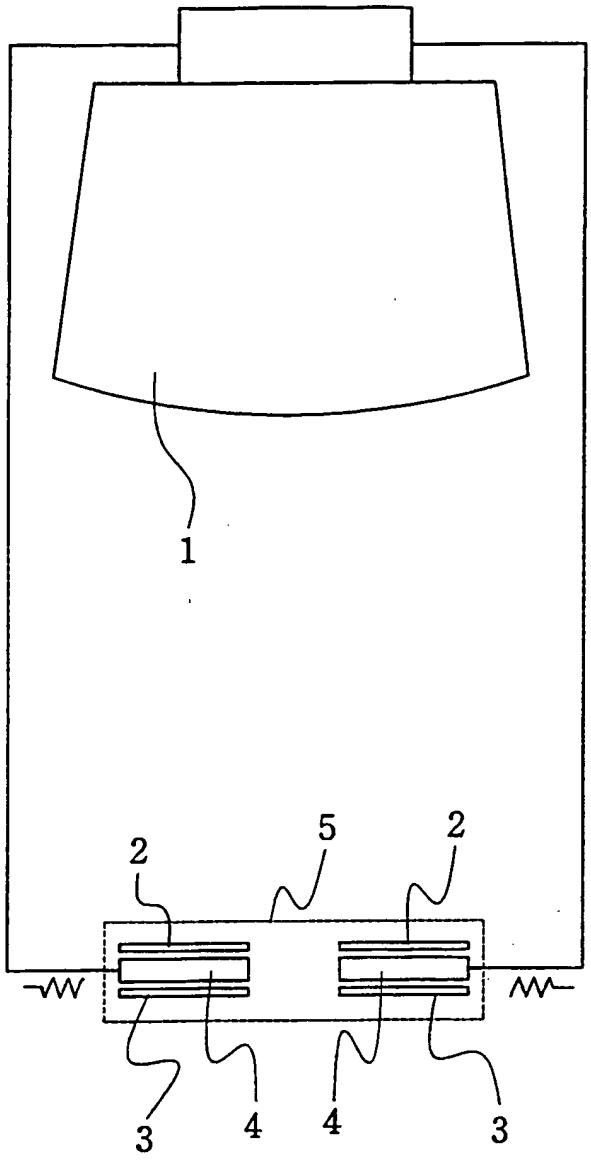


FIG. 2

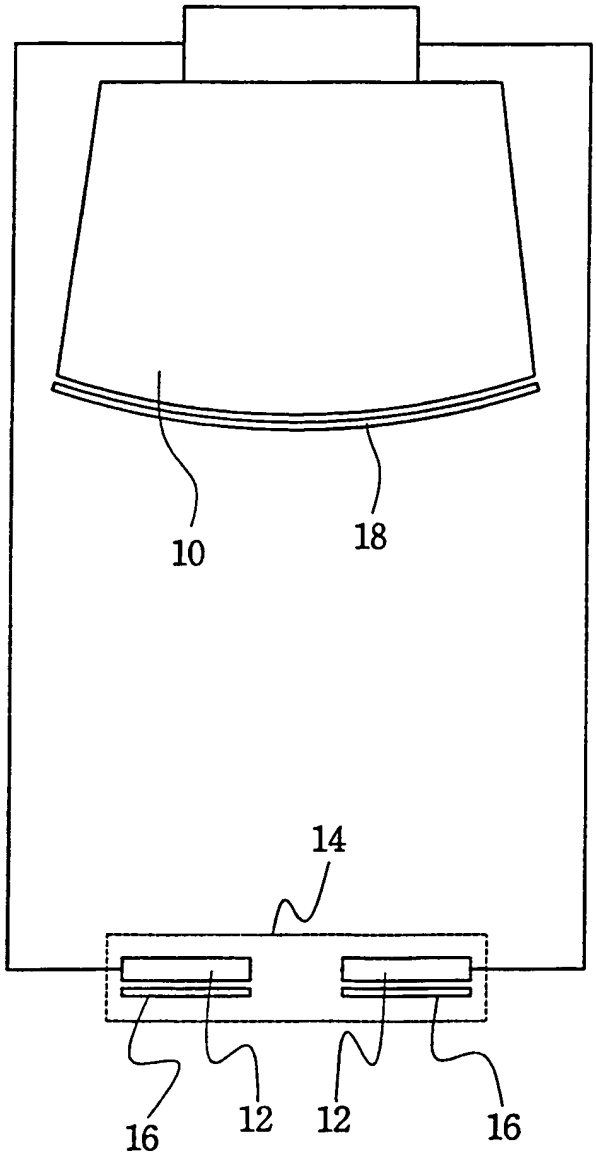
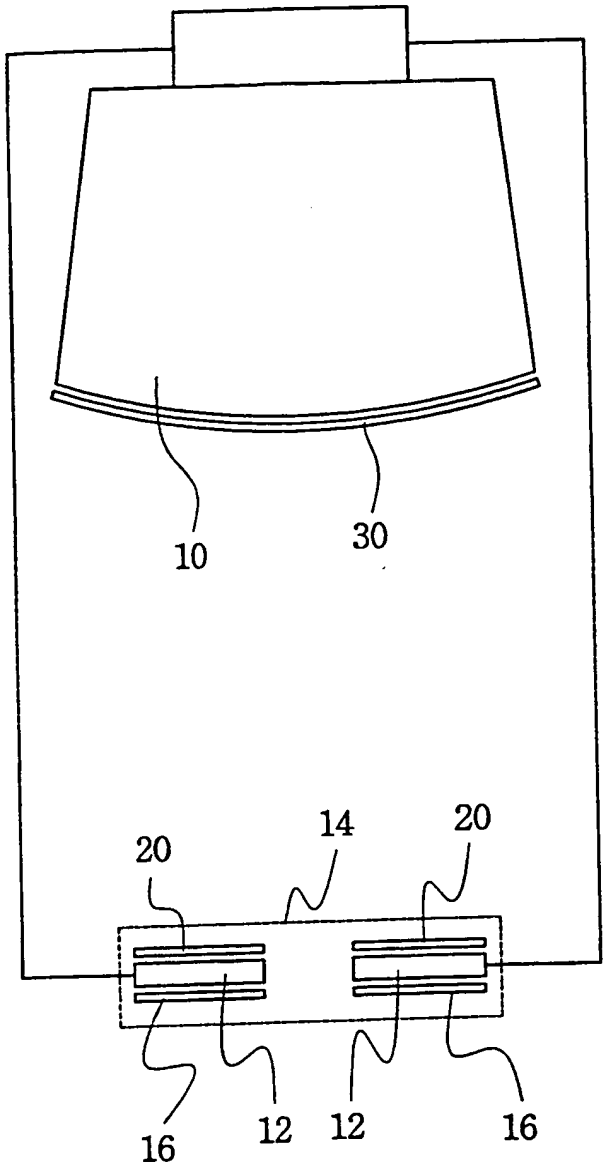


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00596

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7]: H 04 N 13/04; G 02 B 27/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: H 04 N 13/00, 13/04, 15/00; G 02 B 27/22, 27/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 09-138384 A (SANYO ELECTRIC), Patent Abstracts of Japan, Vol.199, No.709, 30 September 1997 (30.09.97), Database PAJ in EPOQUE.	1-3
A	US 4431265 A (BENTON), 14 February 1984 (14.02.84), fig.4; claim 1.	1-3

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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